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Mantis Study Group Newsletter 20

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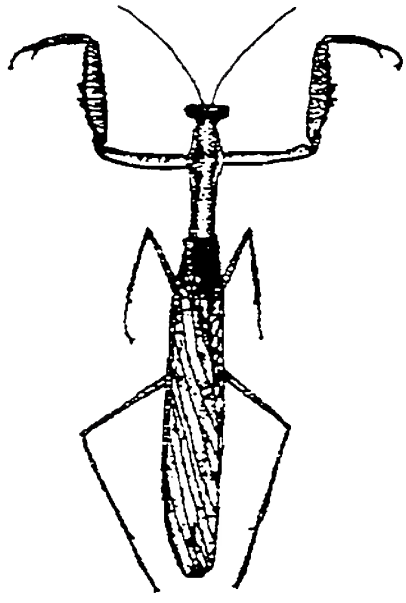


Editorial

Ah! At last, someone else has written for the newsletter. Thanks Murray, and, as usual, thanks to Andy.

The quick thinkers amongst you will be aware that this month is the fifth birthday for the Mantis Study Group. Things have changed a lot in the past five years: particularly the availability of livestock, certainly in the UK. This I think is largely due to the influence of the MSG: dealers and particularly importers are more aware of the interest in mantids and realise that there is a fairly reliable market for mantids. In the past there was a reluctance to import mantids (and many other insects) because of the doubtful market. Mantids are now perceived as readily saleable.

Membership of the group is currently about 54, down from a peak of about 80. The drop is not unexpected, membership of special interest groups always fluctuate since people join on the spur of the moment and do not always sustain an interest. What I do find disappointing is the failure to live up to its name, we do not appear to *study* our mantids. Or if we do, everyone is keeping their results a secret. Very little is published, either in the MSG newsletter, or elsewhere.

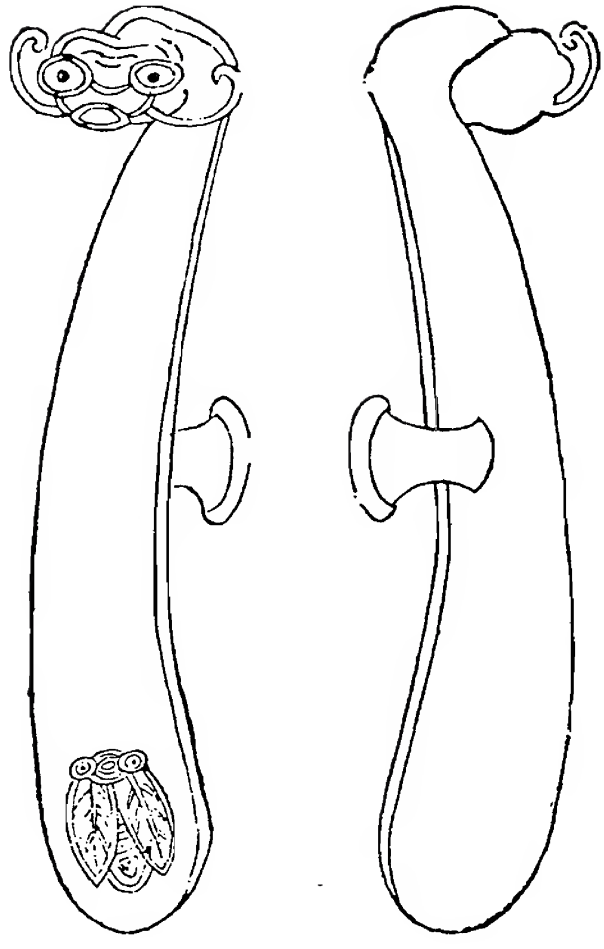
Exhibitions

We hope to be exhibiting at the following events.
October 2001 (Usually the first weekend in October - to be confirmed)
AES exhibition at Kempton Park Racecourse.
December 2001 (Usually the first Sunday in December - to be confirmed)
Midlands Entomological Fair. At Kettering Leisure Village.

Early Evidence for the Chinese Mantis — Murray L. Eiland

Like many popular customs, it is difficult to trace the esteem in which the praying mantis has been held in China. It is ubiquitous today, and is reflected in art in a variety of forms. Particular emphasis is placed on it's predatory behaviour, and many martial arts have adopted the mantis as an emblem. It is also regarded as a lucky animal, and they are kept in small bamboo cages by young and old alike. When approaching the documentary and the archaeological evidence, it is often the day to day activities of a culture that are the most difficult to reconstruct, as these things are taken by people at the time as simply part of the culture. Kings and wars tend to be recorded in documents, and pottery which is made by

thousands of people over thousands of years is studied. There are few references to insects in literature (after all, ancient writers would observe that they stay the same while human culture changes) and it seems there are few surviving depictions of mantids from an early period. What literary references one can find are usually focused not upon the animal itself, but upon human interaction. Moral tales, as well as strange happenings, often require some interpretation to understand the meaning. This need not suggest that the appreciating these insects in the context of the natural world is a new phenomenon, as such things as bamboo cages and wooden models would leave no trace but in the most uncommon circumstances, such as a burial in a desert. Clearly some did have an understanding, albeit of a different nature, of the world around them. A few exceptions to the general dearth of literature on mantids are presented by Laufer (1912), a book that is difficult to obtain (as is the Dover reprint).



Ancient jade buckle, perhaps from the Han dynasty (202 BC - AD 220), from the *Ku yü t'u p'u* manuscript finished in AD 1176.

The first object is a buckle depicted in the *Ku yü t'u p'u*, which described objects that were purportedly recovered in antiquity. Many appear to date from the Han dynasty, roughly equivalent in time to the Roman empire. The title is translated as "Illustrated Description of Ancient Jades" and contained 100 chapters of jades from the collection of the first emperor of the Southern Sung Dynasty (A.D. 1127-1162). It was finished in 1176 and finally published in 1779. It is uncertain how faithfully the publication followed the manuscript, which remained unpublished for over 600 years. It is also somewhat worrisome that no ancient examples of a similar form have apparently come to light in more recent years, and it may be that the objects were fanciful. It may be that further excavation will yield more evidence. The recorded inscriptions on the objects are now regarded as wholly false, as they were almost certainly added to ancient jade at the time, to increase the value. The rather economical but clear reference to a mantis head and a cicada need no explanation; though it seems the artist misunderstood the antennae as whiskers (as on a cat). It seems as though the figure of the mantis was clear enough no to need raptorial front legs, which would have defeated the purpose of the buckle, which would be unworkable with such protrusions. The object is explained by the 12th century authors of the text as reflecting the story of Ts'ai Yung (A.D. 133-192) of the Han dynasty (202 B.C. - A.D. 220). The passage relates how he heard a war song, which extolled the desire for murder, when he arrived at a house He beat a hasty retreat, and when his host and guests finally questioned him, they told him the full story. They said that they saw a mantis on a

tree miss a cicada three times, and were anxious that the mantis should acquire a meal. They played the music in order for the insect to try again! This story is significant in that it is clear that the host and guests at the party were very interested in the mantis. In an era before radio or television, such diversions may have seemed much more natural than today. The story seems to bear little relevance to the buckle in question, barring the fact that a mantis is depicted in both.

Another story, quoted by Laufer (1912: 264) adapted from Giles (1889: 258) is of the philosopher Chuang-tse. (who lived before 250 B.C.): "When Chuang-tse was wondering in the park at Tiao-ling, he saw a strange bird which came from the south. Its wings were seven feet across. Its eyes were an inch in circumference. And it flew close past Chuang-tse's head to alight in a chestnut grove. 'What manner of bird is this?' cried Chuang-tse. 'With strong wings it does not fly away. With large eyes it does not see.' So he picked up his skirts and strode towards it with his crossbow, anxious to get a shot. Just then he saw a cicada enjoying itself in the shade, forgetful of all else. And he saw a mantis spring and seize it, forgetting in the act its own body, which the strange bird immediately pounced upon and made its prey. And this it was which had caused the bird to forget its own nature. 'Alas!' cried Chuang-tse with a sigh, 'how creatures injure one another. Loss follows the pursuit of gain'".

Laufer notes that artists living in the Han dynasty were likely to have drawn inspiration for their art from this passage and not from the passage recorded in the *Ku yü t'u p'u*. It is interesting to note that this story is broadly similar to the one involving a scorpion and a traveller. Broadly, the ending is that both drown in the middle of the river after the scorpion stings his ride. The ending suggests that one can expect no better from the scorpion. Again the story of the mantis and cicada extols the hunting prowess of the mantis, yet paints a picture of a world where the pursuit of gain blinds one to the hazards of the future. Giles (1889) notes that this passage was very popular in everyday life: "Its details have been expressed pictorially in a roughly executed woodcut, with the addition of a tiger about to spring upon a man, and a well into which both will eventually tumble. A legend at the side reads, - "All is Destiny!" In effect it points to the frailty of existence.

Chuang-tse also makes a short allusion to another mantis story, contained in the *Han shih wai chuan* by Han Ying (178-156 B.C.): "When Duke Chuang of Ts'i (794-731 B.C.) once went ahunting, there was a mantis raising its feet and seizing the wheel of his chariot. He questioned his charioteer as to this insect who said in reply: 'This is a mantis; it is an insect who knows how to advance, but will never know how to retreat; without measuring its strength, it easily offers resistance.' The Duke answered: 'Truly, if it were a man, it would be the champion-hero of the empire.' Then, he turned his chariot to dodge it, and this act won him all the heroes to go over to his side."

In this story the virtues of the mantis are again noted, but it is made clear that the human world is more flexible than a raw state of nature. Overcoming strength can be accomplished by no more than a diversion. At the same time if the story interpreted differently, it is clear that an insect would be instantly killed by a chariot. The Duke, not wanting to see such a brave but deluded creature killed, diverted his chariot. By saving the insect, perhaps something of a "hero" to the troops, the Duke earned their esteem.

In the other image, taken from a book dated 1607 (from the *San ts'ai t'u hui*: Laufer, 1912), it is clear that there is a real appreciation of nature. The mantids are realistically drawn, and unlike the buckle (perhaps dating to the Han Dynasty) the antennae are on the top of the head. The upper mantis appears to be displaying to the lower. The legs are carefully drawn, demonstrating detailed powers of observation, yet the posture is not quite correct,

Two mantids from the *San ts'ai t'u hui*, dated 1607.

showing - not surprisingly - only a basic understanding of physiology.

Perhaps the most important aspect of this evidence is to cast doubt on my earlier attribution of an ancient wooden "fantastic monster" as a stick insect (Eiland, 1997). It is likely that the creature was intended to represent a mantis, particularly with the association with destiny. Even more convincing is the cicada on one of the legs. It appears that this is in reference to the story (or perhaps a version of it) of Ts'ai Yung, who was frightened away from a party by the murderous song, only to find that it was to encourage a mantis to eat!

References

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Phyllocrania paradoxica (Burmeister, 1838) — Andy Lasebny.

January 18th 2000 - Received six *Phyllocrania paradoxica* nymphs, about a week old. This is an exotic dead-leaf mantis from Africa. I put each one in a separate container, and these tiny dark brown nymphs are eating quite well. They are quite active, and chase after fruit flies.
January 23th - One of them moults first, I will call this one #1. It is now easier to see this mantis's unusual features - there is quite a prominent "horn" on the little oval shaped head, and the legs have ragged leaf-like extensions. All are quite plump, and keep eating all day, no matter how many flies I give them.
January 25th - Another one moults - #2. They do not want to eat the first day after moulting, but the next day, they actively chase after the fruit flies.
January 26th - One more moults, #3. The other three should moult soon too, since they are quite plump and two of them are ignoring all food.
January 27th - Another moults, #4, and this one is a lighter brown than the others.
January 28th - #5 moults.
January 29th - The last one, #6, moults.
February 4th - Number 1 moults again. Twelve days - not too bad. The leaf-like features are now even more noticeable, with ragged extensions on each side of the abdomen.
February 7th - Number 3 moults the second time.
February 8th - In the morning, #2 has completed its second moult.
February 9th - Number 4 moults again, overnight. Later in the evening, #5 has completed its moult as well.
February 10th - Number 6 moults the second time.
February 19th - Number 1 moults the 3rd time. The appearance of this mantis just keeps getting more elaborate with each moult. It can fold itself up in such a way that it is almost impossible to make out any recognizable outline of its body.
February 22nd - Number 3 moults for the third time.
February 23th - Number 5 moults the third time.
February 24th - Number 4 and #2 moult the third time, early in the morning. Later in the evening, #6 does the same thing. Now all have moulted three times.
March 3rd - Number 1 has its fourth moult. During the last few weeks, these mantises have been getting less active, and do not chase after their prey. They wait until it is close, which is starting to become a problem. They prefer fruit flies, and are reluctant to go after small crickets. Only two of them ate a cricket, and that was only when it climbed up the twig right in front of them. They will, however, grab a small moth that flies erratically inside the container and flies into the mantis's face.
March 9th - Numbers 3 and 5 both had their 4th moult today. Number 1 ate a small cricket today, but the rest still prefer fruit flies. They are starting to get too large for fruit flies, and eat at least eight or ten per day.
March 10th - Number 4 moulted the 4th time, and so did #6.
March 12th - Number 2 has its 4th moult. All of these have now eaten at least a few small crickets, and seem to be getting used to them. This species of mantis seems to prefer very lively, active prey, and they seem to be more likely to go after a cricket if I choose an especially active one. If the cricket just walks slowly along the bottom of the container, the mantis may look at it and watch it go by, but does not strike. Fast moving prey appears to stimulate the mantis into action.

March 24th - Number 1 moults the fifth time. It is taking longer and longer between moults. The only individual that has been eating crickets consistently is #4. This one eats one every day, and only takes a few minutes to catch it. Crickets put into the containers that the others are in are often there for days before they are captured, if at all. Small moths and fruit flies are still preferred by these, and I give them at least something to eat each day, even if there is already a cricket in there.
March 31st - Number 3 moults the fifth time.
April 3rd - Number 6 moults the fifth time.
April 4th - Number 4 and 6 moult the fifth time.
April 6th - Number 2 moults the fifth time. Now there is a noticeable difference in appearance between #1 and #3 and the rest of them. #1 and #3 have small leaf-like expansions on the prothorax - I think this makes them males. The other four are broader, with very wide expansions on the prothorax, and a very wide abdomen. These must be the females.
May 6th - Number 6 moults the 6th time. It is taking even longer between moults. Throughout the month of April, they ate regularly, mostly small meal moths, and the occasional cricket, but it was a cooler than average April. Now it got very hot suddenly, temperatures in the 30's Celsius. Maybe this will make them grow faster.
May 11th - In the morning, at 0600, #2 is in the process of moulting the 6th time. It happens quickly, and the mantis comes out fine. I have been keeping them quite dry, and there are surprisingly no problems with moulting. That same evening, #4 moults the 6th time.
May 12th - Number 3 moults the sixth time and so does #5.
May 13th - Number 1 moults the 6th time. These now have noticeable wing stubs, so maybe there is only one moult left, I do not know. Or, the males may have to moult one less time than the females. They still do not eat all that well and not that often, though they seem to be healthy. They like flies as well as moths. Crickets are still not as readily consumed.
July 7th - After a rather uneventful month of June, number 5 moults the seventh, and last time. It is an adult female. She is about 5cm long, dark brown, with lighter brown wings that really look like brown leaves, complete with veins. On each side of the abdomen are the ragged extensions that look like torn or chewed leaves, and these project outward beyond the wings. The prothorax's triangular leaf-like extensions also enhance the appearance. This part changed shape after the last moult. When seen from above, the prothorax is now diamond shaped. It was more arrow shaped when the mantis was immature.
July 15th - Since becoming and adult, this mantis's appetite has increased noticeably, and she has been eating every day.
July 21st - Number 6 becomes and adult, and it is a female. The abdomen seems to have come out a little crooked, it bends slightly to the left.
August 10th - Female, #5, makes a small, infertile egg case. The others still are not adults. This is taking very long.
August 12th - Number one moults, and is an adult male, just as I thought. He does look quite different from the female. His wings look different, with the tips squared off and ragged, like a dead leaf. The extensions on his prothorax are a lot smaller, and his antennae got very long, even though they were quite short before he became an adult. Before becoming adults, both sexes had equally short antennae. As adults there is a big difference.
August 13th - Number 2, a female, becomes an adult.
August 27th - While two are still not adults, it is time to have the first female, mantis #5, mate. I place the male into a cage that has several stalks of silk flowers in it. I put the

female in with him, and he shows little interest. I put a housefly and a moth inside the cage. The male catches and eats the housefly, the female eats the moth, both at about the same time. The male only glances at the female occasionally. He seems more interested in looking out into the room as I move around feeding other mantises. I check on them every hour or so throughout the day, and the female wanders about the cage, but nothing is happening. Later that night, I turn out the lights. When I go back in to look after about an hour, they are mating. In the morning, they are still together.

August 30th - The female that just mated, #5, makes her first fertile egg case. It is long and thin, similar in appearance to a *Creobroter* egg case, except that it has a long, thread-like projection at one end. She made it on a thick twig I provided for her.

September 4th - After a large meal the day before, that female makes another egg case, only six days later.

September 7th - After three days of failed attempts to mate with female #2, that male finally does. He spent a good portion of two days in the same spot with him and the female not moving at all in the cage. I hand fed the female once, and still no progress until the 3rd day. Now two females are fertile.

September 9th - The newly mated female makes her first egg case. One more becomes an adult, a female. The last one left will be a male.

September 15th - Finally, they are all adults. Number 3 moults into an adult male, after nine months.

September 16th - Number 2 makes her second egg case, and #5 makes her third fertile one.

September 29th - Number 2 makes her third egg case. It is almost time to mate the newest female.

October 3rd - Number 5 makes another egg case, her fourth.

October 13th - Number 2 makes her fourth egg case. And female #5's first egg case hatches - but only two individuals come out. Is there a fertility problem? Maybe more will come out later.

October 21st - One individual hatches out of female #2's egg case. What is going on here?

October 22nd - Number 2 makes her 5th egg case.

October 26th - Number 5 makes her 5th egg case.

November 2nd - Finally, more hatch. Two egg cases hatch, one from female #2, about 15, and about 35 from female #5. The tiny ones are running all over the container. The three that hatched earlier have moulted once. The males have been behaving rather strangely - on several occasions when I walked into the room, one of them would panic, and run all over inside the container, and then do something I never saw another species of mantis do before - play dead. He would drop down onto the ground, lie on his back, and fold up his legs. He would lie there stiff and still for up to 15 minutes. The females are calm and do not seem to panic.

November 7th - Female #2 makes her 6th egg case, and #4 makes her first, but it is infertile since she did not mate yet.

November 8th - Female #5 makes her 6th egg case, right on top of the previous one.

November 21st - Female #5 makes her 7th egg case. After several unsuccessful attempts at having female #4 mate, she makes another infertile egg case. Meanwhile, the hatchlings have begun to eat each other, and need to be separated.

December 1st - Female #2 makes her 7th egg case.

December 4th - Female #5 makes her 8th egg case.

December 5th - Female #4 makes another infertile egg case. Number 6, with the crooked abdomen, has not made any yet. Male, #1, eats quite well and regularly, but male #3 continues to eat very poorly. The hatchlings are eating well, with 12 of them separated into their own containers so far. The ones that are together are eating both store bought flightless fruit flies and wild ones that can fly. All are in their large, well planted cage. There is an open jar with continuously hatching fruit flies in the cage, and that has been working so far.
December 18th - Male #1, who mated with two females, had been acting strangely for more than a week, erratically climbing around the cage, and his tarsi had dried up and fallen off. He slowly began to fade and died on this day, exactly 11 months after I received him as a newly hatched nymph. The rest are still fine, and the hatchlings are growing well. The ones that are together, at least 15, seem to have settled down comfortably on the artificial plants. None climb on the walls or ceiling of the cage any more.
December 19th - Number 6, the female with the crooked abdomen that never made an egg case dies.
December 21st - Female #2 dies, but she had been spitting up brown fluid for a few weeks now.
January 2nd 2001 - Female #4 makes another egg case.
January 3rd - Female #5 dies. The last male left is acting strangely.
January 4th - The male is dead. Only one adult females is left. Apparently, their adult lifespans are really not any longer than any other tropical mantis species. Only the juvenile stage is considerably longer. The small ones are growing quite nicely, and should be adults by late spring.
January 18th - The last adult alive, #4, has been around for one year today. She is doing well, and made another egg case today. The juveniles that are all together in the same cage do not cannibalize each other as frequently, and there has not been any this month. I suppose they have reached their ideal density for that particular cage size. All the small ones are now growing more slowly than they were. The three largest individuals are able to eat wax moths now.
January 26th - Another egg case for this long lived female.
February 9th - Still another egg case. The nymphs in the cage are all now able to eat small crickets, though they do still eat fruit flies as well. Putting in a dozen tiny crickets in there works fine. All are eaten in about a day. There appear to be no more than five or six males out of almost 30 individuals, though it can still be hard to sex them at this age. Though they do not seem to need much water, when I do spray inside the cage, they do drink. There have been no moulting problems, regardless if they are kept humid or dry. Extra humidity does appear to somewhat affect colour - the large cage has more light coloured individuals than those in separate containers, which I rarely spray with water.
February 16th - After a few days of acting restless, the last adult female dies, after almost 13 months. The nymphs are growing well, and there should be at least some adults by May.

Overall, this has been an easy species to keep, with a very high survival rate. There are no unexpected deaths after the first week or so, and their life span is longer than average, but patience is needed to get them through their nymphal stages. And distinguishing male from female is easier in the early stages, since the females have a larger, wider, and differently shaped prothorax.

Mantis abstracts

The following are abstracts from papers published recently, or in some cases details of the paper but without an abstract. The papers are in English unless otherwise indicated. The editor would be grateful for copies of any recently published papers so that abstracts may be included in this section of the newsletters.

Chaturvedi, N. & Hegde, V. (2000) Mantid fauna of Sanjay Gandhi National Park, Mumbai, with some new records for Maharashtra state. *Journal of the Bombay Natural History Society*, 97(2): 295-297.

No abstract available.

Freund, R.L. & Olmstead, K.L. (2000) The roles of vision and antennal olfaction in enemy avoidance by three predatory heteropterans. *Environmental Entomology*, 29(4): 733-742.

We examined the relative importance of vision and antennal olfaction in enemy avoidance by three heteropterans. Jumping spiders (*Phidippus* spp.) served as enemies of *Nabicula subcoleoptrata* (Kirby) and *Nabis americoferus* Carayon, and praying mantids (*Tenodera aridifolia sinensis* Saussure) were used as enemies of *Sinea diadema* (F.). In a greenhouse study, the number of bugs surviving enclosure with spiders or mantids was compared among individuals without vision, without antennal olfaction and controls after 0.5, 1, 4, and 24 hours. For *Nabicula subcoleoptrata* and *S. diadema*, vision appeared to be of primary importance in avoiding capture of enemies. In contrast, most *Nabis americoferus* were killed by spiders and no significant difference in survival existed among the treatment groups. The importance of vision in predator avoidance is in contrast with a recently documented reliance on antennal olfaction for prey location in these species. Thus, stimuli from prey and predators may be segregated to maximize the efficiency of sensory information processing.

Ghate, H.V., Rane, N. & Ranade, S. (2000) Recent record of *Creobroter apicalis* saussure (Insecta: Mantodea) from Pune, Maharashtra and Kumta, Karnataka. *Journal of the Bombay Natural History Society*, 97(2): 297-298.

No abstract available.

Harris, S.J. & Moran, M.D. (2000) Life history and population characteristics of the mantid *Stagmomantis carolina* (Mantodea: Mantidae). *Environmental Entomology*, 29(1): 64-68.

We investigated the life history and populations characteristics of the Carolina mantid, *Stagmomantis carolina* (Johannson), in central Arkansas. Unlike several studies on other mantis species found in the United States, this species was found at very low densities in the field as measured by adult abundance and ootheca density. We found that mortality was high during the egg stage because of developmental failure or egg parasitism. In replicated field plots, mortality and emigration was high during the 1st and 2nd stadia, resulting in very low numbers of in-plot survivors ($< 1\%$) by the 3rd stadium of development. Synchronous versus asynchronous hatching had statistically significant effects on emigration and in-plot mortality but a nonsignificant effect on in-plot survival, although the trend was for increased survival in asynchronous plots. Although arthropod abundance tended to be lower in mantis plots, *S. carolina* had no significant effects on total arthropod abundance, total arthropod biomass, or the abundance and biomass of any arthropod order. Laboratory experiments indicated that this

species has slower development during the egg stage and slower development during the nymph stages compared with related mantis species. This slow growth may in part explain the high mortality rate and therefore explain the low density of S. carolina found in this population. However, this growth strategy seems necessary for survival because it allows for proper timing of oviposition for a univoltine life cycle in central Arkansas. Comparative studies of this species in other portions of its range would be interesting in determining the generalities of our findings.

Iwasaki, T. (2000) Life history of the torymid wasp *Podagrion nipponicum* parasitizing eggs of the praying mantis. *Entomological Science*, 3(4): 597-602.

The life history of the torymid wasp *Podagrion nipponicum* was investigated under quasi-natural conditions. Adult wasps of the overwintering generation that emerged from egg cases of the praying mantis *Tenodera aridifolia* in April, laid eggs into unhatched egg cases of *T. aridifolia* and *T. angustipennis*. Adult wasps of the first generation emerged from these egg cases in late May to mid June. They laid eggs into unhatched egg cases of *T. angustipennis*. Adult wasps of the second generation emerged from these egg cases in late June to early July. Adult females lived longer than males in the first and second generations. Some females of the first and second generations survived until mid November, while none of the overwintering generation until late August. Adults of the second generation preferred newly-laid egg cases of *T. aridifolia* to those of *T. angustipennis*, when offered a choice between them in autumn. This result is consistent with the previous finding that no adult wasp of the overwintering generation emerged from overwintering egg cases of *T. angustipennis* in spring. Our results suggest that *P. nipponicum* has a multivoltine life cycle, and that its oviposition preference for egg cases of *Tenodera* species changes among generations.

Koblik, Y.A., Chernyakhovskiy, M.Y., Voltzit, O.V., Vassilieva, A. B. & Formozov, N.A. (2000) Some characteristics of the position of the primary Faunistic border in Nepalese Himalayas. *Byulleten' Moskovskogo Obshchestva Ispytatelei Prirody Otdel Biologicheskii*, 105(4): 3-21.

The border between the Palaearctic and Indo-Malayan biogeographical realms was studied in a valley of the Kali Gandaki river (Mustang district of Nepal) in terms of the data of four classes of vertebrates (Mammalia, Aves, Reptilia and Amphibia) and two groups of invertebrates (Insecta, Orthopteroidea and Acari, Ixodidae). The two groups (Aves, Orthopteroidea) for which we had the most material produced similar results. The fauna changes abruptly in the vicinity of Kalopani where the river valley makes a sharp turn. This turn prevents warm and moist air for rising along the valley. 219 species of birds were observed. 96 species of Orthopteroidea were collected (earwigs - 8 species, cockroaches - 11, walking sticks - 3, praying mantids - 7, grasshoppers, locusts, crickets etc - 67). 12 species of ticks found as well as 13 species of reptiles and amphibians. Mammals were collected only in the vicinity of Jomsom where their fauna is purely Palaearctic.